Appendix N
Stormwater Best Management Practices (BMPS)

I. INTRODUCTION

The purpose of this appendix is to provide guidance for choosing the Best Management Practices (BMPs) to control the quantity and quality of stormwater at projects where the Site Assessment and Mitigation (SAM) Program of the San Diego County of San Diego Department of Environmental Health is the lead agency. As part of the SAM permit requirements, stormwater control needs to be used to reduce or eliminate potential pollutants from entering stormwater conveyance systems or waters of the state. Many sections of the SAM Manual make reference to this appendix as the first steps to be used for the control of stormwater at a site.

This appendix is not an exhaustive guide for all possible situations that may arise during SAM activities. However, an attempt has been made to address the more common activities conducted at a typical SAM site. For activities that may not be covered in this appendix, you will find additional references within this appendix to assist you in selecting an appropriate BMP.

In providing the guidelines to ensure compliance with the Municipal Permit (see description below), this appendix is divided into three categories as follows:

A. Sediment/Soil
B. Water
C. Transportation

Each of these categories addresses common activities and minimum BMPs that must be used during these activities. Table N-1 at the end of the appendix lists common SAM activities and the appropriate stormwater BMPs that correspond to each activity. Figure N-1 illustrates the decision-making process pertaining to stormwater BMPS at SAM sites.

II. REGULATORY FRAMEWORK

The County of San Diego is required to comply with the San Diego Regional Water Quality Control Board (RWQCB) Order No. 2001-01 National Pollution Discharge Elimination System (NPDES) – Municipal Stormwater Permit Number CAS 0109758 by enacting requirements to protect water quality throughout the San Diego region. San Diego County Ordinances No. 9424 and 9426 were adopted by the Board of Supervisors on February 21, 2002, and allow for the regulation of stormwater, particularly addressing the management and discharge of pollutants to the County's stormwater conveyance system and receiving waters.

Order No. 2001-01was issued by the RWQCB to the County of San Diego, the incorporated cities of San Diego County, and the San Diego Unified Port District (co-permitees). The Municipal Stormwater Permit sets waste discharge requirements for discharges of urban runoff to the municipal separate storm sewer systems (MS4s) draining the watersheds of the San Diego region.

In addition, the Order seeks to protect the health and safety of County of San Diego residents by:

- Prohibiting polluted non-stormwater discharges to the stormwater conveyance system and receiving waters.
- Setting minimum requirements for stormwater management.
- Requiring development projects to reduce stormwater pollution and erosion.

- Requiring the management of stormwater flows from development projects to prevent erosion and to protect and enhance existing water dependant habitats.

- Establishing standards for the use of off-site facilities for stormwater management.

- Establishing notice procedures and standards for adjusting stormwater and non-stormwater management requirements where necessary.

The use of BMPs to control stormwater within and running off a SAM site would generally follow guidelines for regulated facilities or construction sites. SAM sites that are currently regulated businesses or are actively in construction may have Storm Water Pollution Prevention Plans (SWPPP) in-place that define appropriate BMPs for the planned activity. Should the SAM-related activity include operations that could potentially create other forms of contaminated non-stormwater releases, modification to the plan or submittal of a new plan is warranted. Sites that are currently inactive, or those that do not have an approved SWPPP will require submittal and approval of a plan that at a minimum meets County ordinances. If a SWPPP has not been prepared, a Stormwater Management Practices Standard Project Form (Table N-2), included in Appendix N, can be included and attached to a SAM workplan. It is important to contact the individual co-permittee regarding individual requirements. Table N-3 at the end of Appendix N lists the contact phone numbers for each of the co-permittees.

Many activities at SAM sites require BMPs to manage stormwater flows, prevent non-stormwater discharges, and prevent erosion. It is important that BMPs at SAM sites be continually evaluated for effectiveness at various stages of the regulatory process. Documents provided to SAM, such as workplans, interim remedial action plans and corrective action plans, must include proposed stormwater BMPs as part of their scope of work. .

III. STORMWATER BMPS FOR SAM SITES

A. Sediment / Soil

All contaminated or potentially contaminated soil must be managed to prevent it from being discharged into a stormwater conveyance or receiving water. All contaminated soil must be placed on an impervious surface (or plastic ground covering), bermed and completely covered with plastic sheeting.

1. Excavations, UST Removals/Installations, Remediation Trenching

During UST removals/installations, or trenching, adequate perimeter protection BMPs must be installed and maintained to prevent the discharge of stormwater pollutants. All storm drain inlets on site must be protected using inlet protection BMPs. Excavation should take place during a period of time when no rain event (greater than 50 percent probability) is forecasted. During a significant storm event, BMPs, such as the following, must be implemented to control runoff from the Site:

- **Silt fence:** A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff.

- **Gravel bag barrier:** A gravel bag barrier is a temporary linear sediment barrier consisting of stacked gravel bags, designed to intercept and slow the flow of sediment-laden sheet flow runoff.

- **Straw bale barrier:** A straw bale barrier is a temporary linear sediment barrier consisting of straw bales, designed to intercept and slow sediment-laden sheet flow runoff.

- **Fiber rolls:** Fiber rolls (sediment logs or wattles), composed of bio-degradable fibers stuffed in a photo-degradable open weave netting, are designed to reduce sediment runoff from disturbed sediment into the storm drain system or watercourses. Fiber rolls are porous and allow water to filter through fibers and trap sediment, increase filtration rates, slow runoff, and reduce sheet and rill erosion.

- **Drop inlet sediment barrier:** A drop inlet sediment barrier is a temporary barrier placed at an inlet. The sediment barrier may be constructed of stone, concrete block, straw bales, or silt fence material, and gravel. These barriers will prevent sediment from entering the storm drains during construction operations. Sediment-laden runoff is ponded before entering the storm drain, thus allowing some sediment to fall out of suspension.

- **Curb inlet sediment barrier:** Curb inlet sediment barriers are temporary barriers constructed from concrete block and gravel or gravel filled sandbags. These barriers are intended to reduce the sediment discharged into storm drains by ponding the runoff and allowing the sediment to settle out. The structures allow for overflow from high runoff events and the gravel allows the ponds to dewater rapidly.

2. Stockpiles

A stockpile should be placed on plastic and covered when no material is being added to the stockpile. Protection of stockpiles is a year-round requirement. Procedures and practices to reduce or eliminate pollution of stormwater from stockpiles of soil, rock and paving materials, such as portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, aggregate subbase or pre-mixed aggregate and asphalt binder (so called “cold mix” asphalt), is required. The following practices are required:

- Locate stockpiles away from concentrated flows of stormwater, drainage courses, and inlets.

- Protect all stockpiles from stormwater run-on using a temporary perimeter sediment barrier such as berms, dikes, silt fences or gravel bag barriers.

- Implement wind erosion control practices as appropriate on all stockpiled material.

3. Drilling

During a rain event, BMPs, such as those used for sediment stockpiles, should be implemented to prevent water that comes in contact with drill cuttings from entering the stormwater conveyance system. Bagged materials must be placed on pallets and under cover. Following drilling activities, remove cuttings and clean the site to the maximum extent practicable.

4. Nonoperating Sites

Nonoperating sites are sites that are being remediated or monitored by an oversight agency (i.e. SAM, RWQCB) but are not conducting retail operations. Often these sites are not covered by asphalt or concrete and are subject to erosion. These sites should be assessed to ensure that the minimum BMP's necessary to prevent materials from entering the stormwater system have been implemented. Minimum BMP's should include:

- Practice good housekeeping
- Contain waste
- Minimize disturbed areas
- Stabilize disturbed areas
- Protect slopes/channels
- Control site perimeter
- Control site erosion

In addition, since non-operating sites are exposed and subject to erosion, dust control measures may need to be implemented to minimize dust generation and the off-site migration of dust into the stormwater conveyance system.

Dust control measures are practices that help reduce surface and air movement of dust from disturbed sediment surfaces. Particular dust control measures that are implemented at a site will depend on the topography and land cover of a given site, as well as the soil characteristics and expected rainfall at the site.

A number of methods can be used to control dust from a site. The following is a brief list of some control measures and their design criteria. Not all control measures will be applicable to a given site:

- **Sprinkling/Irrigation:** Sprinkling the ground surface with water until it is moist is an effective dust control method for haul roads and other traffic routes.

- **Vegetative Cover:** In areas not expected to handle vehicle traffic, vegetative stabilization of disturbed soil is often desirable.

- **Mulch:** Any loose covering of soil with organic residues, such as grass, straw, or wood fibers, can be used to check erosion and stabilize exposed soil. Mulching can be a quick and effective means of dust control for a recently disturbed area. Mulch should only be applied a few inches in depth. Runoff, contaminated with organic material, is typical when excess mulch is applied, especially on slopes.

- **Wind Breaks:** Wind breaks are barriers (either natural or constructed) that reduce wind velocity through a site and therefore reduce the possibility of suspended particles.

- **Stone:** Stone may be an effective dust deterrent for construction roads and entrances or as a mulch in areas where vegetation cannot be established.

- **Spray-on Chemical Soil Treatments (palliatives):** Examples of chemical adhesives include resin-water emulsions, bonded fiber matrix, and guar binder.

If structural controls are used, they should be inspected for deterioration on a regular basis to ensure that they are still achieving their intended purpose.

A. Water

Discharge of contaminated non-stormwater to conveyance systems is prohibited unless regulated by a NPDES or waste discharge permit. Incidental non-stormwater generated from these activities must be contained. Depending upon volume, non-stormwater may be allowed to accumulate and evaporate, or may be sampled to determine suitability for discharge to the sewer system.

Non-stormwater generated at a SAM site should be contained and properly handled. The use of standard land disturbance BMPs such as covering storm drain inlets with plastic/weighted and taped or other material used for this purpose, silt fencing, gravel bags around the perimeter of the site, desilting basins, and construction site entrance stabilization should be included in plans for UST Installation or Closure, Site Assessments and Corrective Action. Specific BMPs for these activities may be obtained from the "County of San Diego Stormwater Standards Manual", Table A Attachment F-1 of the County of San Diego Storm Water Management Plan, or from the "Caltrans Storm Water Quality Handbooks" and the "California Storm Water BMP Handbook for Construction."

1. Spill Prevention and Control

BMPs are implemented anytime chemicals and/or hazardous substances are used or stored. Spills should be immediately mitigated using dry methods if practicable, but if wet methods are necessary, all downstream storm drain inlets must be properly protected to prevent discharges. Water used for cleaning and decontamination shall be retained on-site and shall be collected and disposed of properly. Maintain spill response kits on-site at all times and control spills in a manner that prevents the discharge of spilled material to the conveyance system or watercourses.

2. Water Control at Excavations

Take all necessary precautions and preventative measures to prevent the flow of water, including groundwater, from mixing with hazardous substances or entering underground storage tank excavations. Preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof. If water enters an excavation and becomes contaminated, such water shall be collected and removed. Contaminated water shall be retained in clean, closed top, watertight holding tanks. Dispose of this water in accordance with all federal, state, and local laws.

3. Sediment Control

Discharging sediment-laden water, as a result of an excavation dewatering, into any stormwater conveyance system or water of the State without filtration is prohibited. Therefore a temporary method to filter sediment-laden water from excavated areas on construction sites must be implemented prior to discharge to the storm drain or surface waters. Applicable methods of sediment control include: filter box, portable sediment tank, sump pit, and perforated standpipe wrapped in filter pack and surrounded by stones. The filtration structure must be inspected frequently during operation and repaired or replaced once sediment build-up decreases the efficiency of the structure design. Water, resulting from the dewatering of an excavation that is part of an unauthorized release investigation or remediation, is prohibited from being discharged to a stormwater conveyance system or receiving water. Water may be discharged under a Waste Discharge Requirements (WDR) permit or site specific permit issued by the RWQCB, provided compliance with all relevant NPDES or WDR permit conditions is maintained to the satisfaction of the RWQCB.

B. Transportation

1. Construction Site Exits

The purpose of stabilizing exits at a site is to minimize the amount of sediment leaving the area via motorized vehicles. All exits to a site must be stabilized prior to site disturbance activities. The stabilized site exits should be long and wide enough so that the largest construction vehicle that will enter the site will fit through the exit with room to spare. If many vehicles are expected to use an exit in any one day, the site exit should be wide enough for the passage of two vehicles at the same time with room on either side of each vehicle. The following are BMPs that will assist in controlling the amount of sediment leaving a site:

- Install a pad of gravel over filter cloth at the site exit. As a vehicle drives over the gravel pad, mud and sediment are removed from the vehicle's wheels and offsite transport of sediment is reduced.

- Establish a vehicle washing station at the site exit. Wash stations can remove a substantial amount of sediment from tires and under the carriage of vehicles before they leave a site. This prevents sediment from being transported onto public roadways. Divert runoff from vehicle washing stations into a sediment trap to help ensure that sediment and rinse water are kept on-site and disposed of properly. Remove accumulated sediment from the wash rack and/or sediment sump to maintain system performance.

- Sweep and/or vacuum sediment from paved loading, unloading and stockpile areas to prevent the sediment from entering a storm drain or watercourse. Properly dispose of waste at an approved dumpsite. Since sweeping and vacuuming may not be effective when sediment is wet or muddy, other BMPs may have to be implemented to remove the sediment from the roadway.

- Sweep paved areas adjacent to the site exit.

2. Vehicle/Equipment Maintenance, Fueling and Washing Areas

Sites that perform onsite vehicle and/or equipment maintenance, fueling or washing need to implement BMPs to prevent pollutants from entering the stormwater conveyance system and the groundwater supply. The following BMPs shall be implemented at all vehicle and/or equipment maintenance and washing areas:

- Designate a paved and covered area for maintenance, fueling and washing. If the site does not have a paved surface, implement appropriate BMPs to ensure that pollutants cannot enter the stormwater conveyance system.
- Eliminate improper connections from these areas to the storm drain system.
- Maintain a spill kit on-site at all times and develop a spill prevention and cleanup plan for vehicle maintenance and repair areas and all equipment that may leak hazardous materials.
- Elevate hazardous materials off of the ground and store indoors or cover with an impervious material such as a tarp, if stored outdoors. Keep hazardous material containers lidded and properly labeled at all times.
- Dispose of hazardous materials and wash water in accordance with all federal, state and local laws and regulations.
- Inspect vehicles and equipment for leaks daily. Repair leaks immediately.

IV. DEFINITIONS

Best Management Practices: Best Management Practices (BMPs) are defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operation procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage. In the case of municipal stormwater permits, BMPs are typically used in place of numeric effluent

Catch Basin: A storm drain inlet having a sump below the outlet to capture settled solids.

Copermittee (or Co-permittee): A permittee to the Municipal Stormwater Permit that is only responsible for permit conditions relating to the discharges from its area of jurisdiction.

Dewatering Operations: The removal of groundwater during construction activities.

Discharge: The volume of liquid and/or solid that passes a fixed point within a given period of time. An all-inclusive outflow term that describes a variety of flows such as from a pipe to a stream, or from a stream to a lake or ocean.

Dry Weather Season: May 1 through September 30 of each year.

Dry Cleaning Methods: Cleaning techniques which include use of a broom and dustpan, a vacuum, or mop, to clean up spills or debris.

Good Housekeeping: A common practice related to the storage, use, or cleanup of materials performed in a manner that minimizes the discharge of pollutants.

Monitoring: Refers to a variety of activities and processes through which Copermittees may obtain information relevant to implementation of their storm water quality management programs so that the need for and/or opportunities for revision or refinement can be identified.

Municipal Stormwater Permit: NPDES Order No. 2001-01, adopted February 21, 2001 by the San Diego RWQCB, which sets waste discharge requirements for discharges of urban runoff to the municipal separate storm sewer systems.

National Pollution Discharge Elimination System (NPDES): These permits pertain to the discharge of waste to surface waters only. All State and Federal NPDES permits are also Waste Discharge Requirements (WDR).

Pollution: Defined in the Porter-Cologne Water Quality Control Act, section 13050 (l) "means an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects either of the following:

(A) The waters for beneficial uses.
(B) Facilities which serve these beneficial uses.

Pollution may include contamination."

Rainy, Wet Weather Season: October 1 though April 30.

Receiving Waters: All surface water bodies within the permit area into which wastewater or treated effluent is discharged.

Sediment: Organic or inorganic material that is carried by or suspended in water.

Spill: An accidental dumping or spilling of a potential pollutant onto the ground or into a waterway.

Storm Water (or Stormwater): "Stormwater" is defined as urban runoff and snowmelt runoff consisting only of those discharges that originate from precipitation events. Stormwater is that portion of precipitation that flows across a surface to the storm drain system or receiving waters.

Storm Water (or Stormwater) Conveyance System: Streets, gutters, inlets, conduits, natural or artificial drains, channels and watercourses, or other facilities that are owned, operated, maintained and used for the purpose of collecting, storing, transporting or disposing of stormwater.

Structural Control: A type of best management practice (BMP) that employs engineered and constructed systems to improve the quality and/or quantity of runoff (e.g. detention ponds and constructed wetlands).

REFERENCES

County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance, Chapter 8, Article 1, Section 67.

Guide for BMP Selection in Urban Developed Areas (2001). ASCE Envir. and Water Res. Inst. Reston, VA.

National Stormwater Best Management Practices Database (2001). Urban Water Resources Research Council of ASCE. Wright Water Engineers, Inc.

Construction Site BMP Manual for 2000. State of California Department of Transportation Storm Water Quality Handbooks.

Development Planning for Stormwater Management. A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), (May 2000). Los Angeles County Department of Public Works.

Reference Guide for Stormwater Best Management Practices. (July 2000). City of Los Angeles Urban Runoff Management Division. Los Angeles, CA.

Start at the Source, Design Guidance Manual for Stormwater Quality Protection. Bay Area Stormwater Management Agencies Association. 1999 Edition. Oakland, CA.

San Diego County Association of Resource Conservation District. Spring, 1998 San Diego County Edition. Best Management Practices for Erosion and Sediment Control and Storm Water Retention/Detention

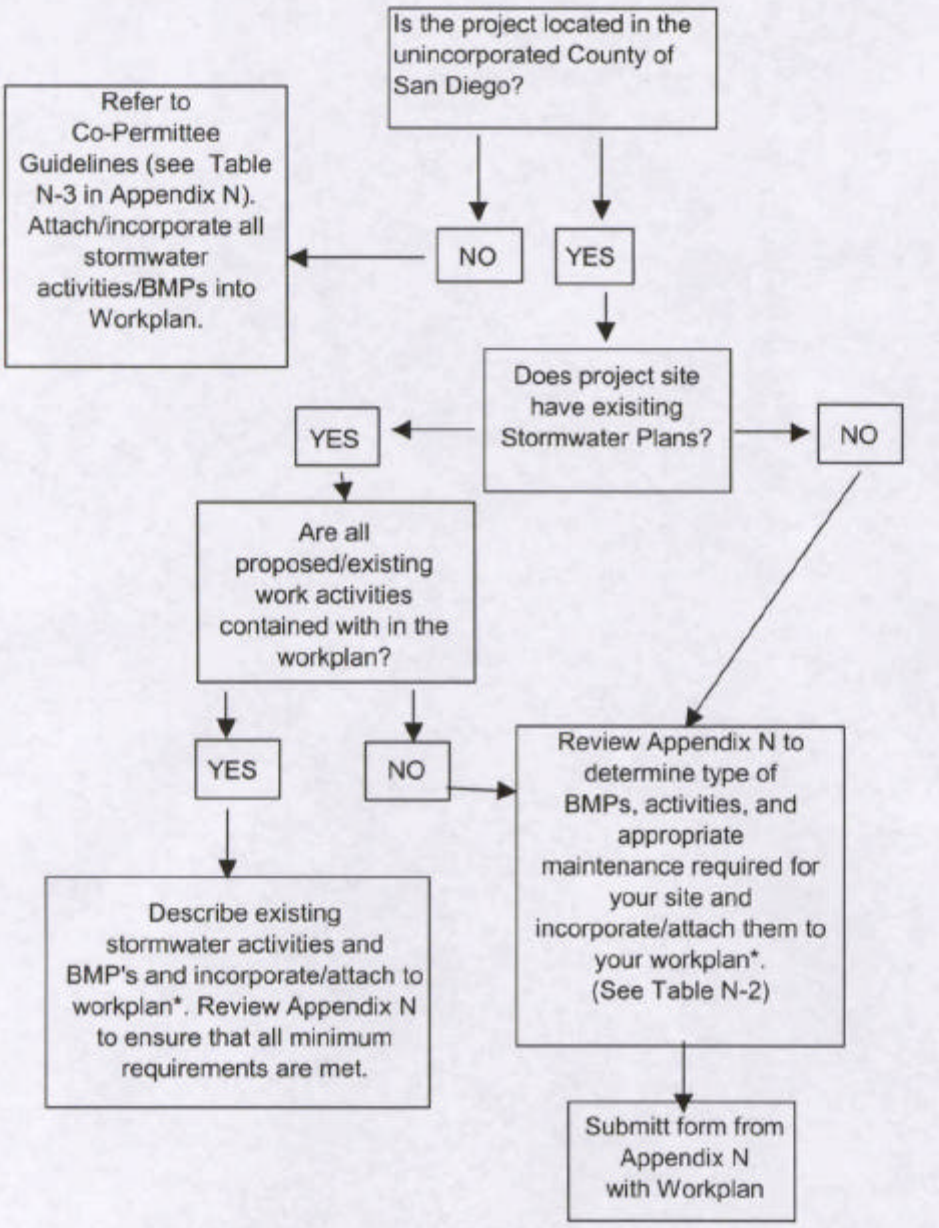
Caltrans Urban Runoff Quality Handbook: Planning and Design Staff Guide (Best Management Practices Handbooks (1998). California Department of Transportation.

California Industrial/Commercial Stormwater Inspection Program Handbook for Municipal Agencies. Alameda Countywide Clean Water Program. March 1996

California Urban Runoff Best Management Practices Handbooks (1993) for Construction Activity, Municipal, and Industrial/Commercial. Los Angeles County Department of Public Works.

Designing for Effective Sediment and Erosion Control on Construction Sites. Jerald S. Fifield, Ph.D., CPESC.

Figure N-1 - SAM Stormwater Decision Tree San Diego County



** Instead of listing/describing all stormwater activities and BMPs, you may reference the SAM Manual Appendix N in your workplan and state that you will adhere to said guidelines.*

FIGURE N-2
Common Stormwater Symbols

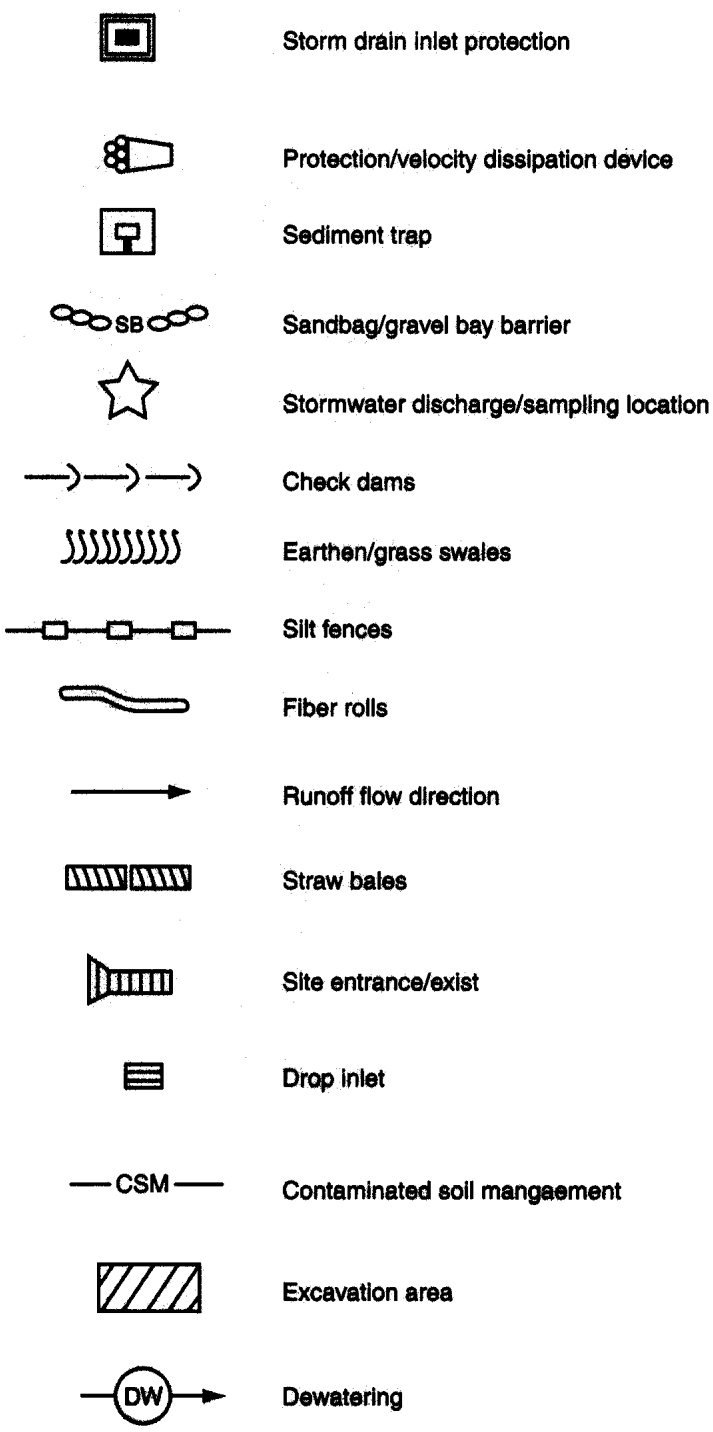


Table N-1 - Stormwater BMPS By SAM Activity

Categories of SAM Activities	Stormwater Best Management Practices																
	Silt Fence	Gravel Bag Barrier	Straw Bale Barrier	Fiber Rolls	Check Dam	Hydraulic Mulch	Hydroseeding	Soil Binders	Straw Mulch	Erosion Control Covers	Sediment Trap	Street Sweeping and Vacuuming	Stabilized Construction Roadway	Entrance/Outlet Tire Wash	Shaker Plates	Good Housekeeping Practices
Soil																
Drilling												X				X
Stockpiles		X	X	X						X						
Excavation Materials	X	X	X	X	X						X					
Trenching	X	X	X	X	X						X					
UST Removal	X	X	X	X	X						X					
Non-operative Sites (Dirt Lots)	X	X	X	X	X	X	X	X	X	X	X					
Water																
Decontamination												X				X
Transporation																
Construction Site Entrances												X	X	X	X	X
Vehicle Maintenance and Washing Area											X	X				X

Table N-2: Stormwater Management Practices
Standard Project Form

Project Site: Street Address_____City_____

SAM Case #: H_____ **Owner:** _____

1. The following categories of activities checked on the left side of the table below are anticipated to take place during the course of this SAM Case project. The best management practices checked for each category of activity will be available and implemented as appropriate over the course of the project.

Categories of SAM Activities	Stormwater Best Management Practices															
	Silt Fence	Gravel Bag Barrier	Straw Bale Barrier	Fiber Rolls	Check Dam	Hydraulic Mulch	Hydroseeding	Soil Binders	Straw Mulch	Erosion Control Covers	Sediment Trap	Street Sweeping and Vacuuming	Stabilized Construction Roadway	Entrance/Outlet Tire Wash	Shaker Plates	Good Housekeeping Practices
Soil																
Drilling																
Stockpiles																
Excavation Materials																
Trenching																
UST Removal																
Non-operative Sites (Dirt Lots)																
Water																
Decontamination																
Transporation																
Construction Site Entrances																
Vehicle Maintenance and Washing Area																

2. Monitoring to be implemented to ensure proper application and maintenance of BMPs:

_____

_____

_____

3. Other comments:

_____

_____

_____

Table N-3 - Co-Permittee Contacts

Co-Permittee Stormwater Contacts

Entity	Department	Phone Number
County of San Diego		888-846-0800
San Diego Unified Port District	Environmental Services	619-686-6254
City of La Mesa	Public Works	619-667-1450
City of El Cajon		619-441-1653
City of National City	Engineering	619-336-4380
City of Imperial Beach	Public Works	619-423-8311
City of Chula Vista	Engineering	619-691-5021
City of Carlsbad	Public Works / Water	760-438-2722
City of Oceanside	Water Utilities	760-435-5800
City of Encinitas	Engineering	760-633-2770
City of Del Mar		760-753-1120
City of San Diego		619-525-8647
City of Lemon Grove		760-438-2722
City of Escondido		760-839-4668
City of Poway	Public Services	858-679-5415
City of Coronado	Public Services	619-522-7380
City of San Marcos	Public Works	760-744-1050
City of Solana Beach	Engineering & Public Works	858-720-2470
City of Santee	Development Services (Stormwater)	619-258-4100
City of Vista	Engineering	760-726-1340

Co-Permittee Excavation Contacts

Department	Phone Number
Planning and Land Use	858-565-5981
Parks & Recreation	619-686-6467
Engineering	619-667-1154
Planning and Zoning	619-441-1741
Engineering	619-336-4380
Community Development	619-628-1356
Permits & Licenses	619-691-5024
Planning & Community Development	760-755-9337
License & Permit	619-446-5000
Planning	619-825-3815